

Fed Tapering: How Has Fed's Announcement of Tapering Affected Consumers and Foreign Economy?

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Abstract: This article's purpose is to investigate the Federal Reserve's tapering decision and how it affects consumers' behavior and the foreign economy. To generate a prediction of how tapering changes consumers' behavior, we recorded the dates that FOMC has made announcements and used them to create a regression analysis with the US treasury yield. To make sure our statistical inference is reliable, we analyzed different types of treasury bonds, which include 1 year, 3 years, 5 years, 10 years, and 30 years. We also utilized the real-interest rate and Chinese Yuan to US dollar exchange rate to analyze the correlation between interest rate and exchange. The purpose is to give a rough understanding of how tapering could affect foreign economy. When we are concluding the analyzed result, a counterintuitive finding appears. When the Fed announces a tapering or tightening decision, we should expect an increase in the interest rate. However, the interest rate decreases whenever the Fed decides to taper. On the other hand, as the interest rate falls, we should expect a depreciation of the dollar and a decrease in the price of America's goods and services. It should've benefited foreign economies, but instead, it worsens them and causes their currencies to further depreciate. Altogether, the results suggested that the Fed's tapering decision will change consumers' behavior and unavoidably decline other countries' economies.

Keywords: business cycle, quantitative easing, tapering, quantitative tightening.

1. Introduction

In 2008, due to Lehman Brother's bankruptcy, a global scale economic recession was trigger. This is known as the Global Financial Crisis; many financial firms are affected and announced bankrupt following Lehman Brother, it became hard for business to survive in this situation. In order to recover the economy, United States launched a massive scale securities-buying program called "Quantitative Easing". It was meant to lower consumers' cost of borrowing money, thus incentivize them to spend more, and ultimately increase market activities to its previous level. The outcome was cheering; the economy does seem to get better, but the implementation of Quantitative Easing comes with a side effect, and that is inflation. Federal Reserve worries that if they continue this program, market might be overheated and quickly went into another recession. Therefore, in 2013, Federal Reserve's Chairman Ben Bernanke announces to taper from the quantitative easing program. However, people were terrified from receiving this message, and it causes them to desperately seek the opportunity to sell their treasury bonds, ultimately leads to a surge in long-term treasury rate. This is known as "taper tantrum". Following this impactful event, Basu, Eichengreen, and Gupta [1] states in their paper

“From Tapering to Tightening, the impact of Fed’s exit on India”, that after Bernanke’s “tapering talk”, many countries took a hard hit, and India was among them. They claimed that “Between May 22, 2013, and the end of August 2013, the exchange rate depreciated by 18% ... India might be heading toward a full-blown financial crisis.” It appears that tapering was not only affecting United States’ economy, but it also worsens other countries economy. In 2021, Fed has announced another tapering decision, but they have learned their lesson from last time. A clear enough communication was provided to the consumers to prevent taper tantrum from happening again.

This paper is going to focus on how Fed’s tapering decision affected domestic economy and induces a change in consumers’ behavior, and how this shift of US monetary policy affect the foreign economy. Through analyzing the data, we’ve found an interesting result, which does not comply with our intuition toward this topic. However, there seems to be a reasonable explanation for this bizarre phenomenon.

2. Literature Review

Before we begin to discuss how tapering could affect both domestic and foreign market, we should be able to understand the cause of it, and what does Federal Reserve wish to achieve by tapering. The concept “Business cycle” was first suggested by John Maynard Keynes [2], who believed that the economy exhibits a pattern of gradually shifting from expansion to contraction, and back to expansion again, forming a cyclical pattern. This pattern is an embodiment of interactions between demand and supply of the market. When the economy is in the expansion phase, income increases; therefore, people have more wealth to afford more goods and services, inducing a growth in demand. However, if demand increases faster pace than production, or production remains at the same level; then it could result in an inflation or asset bubble, where commodities are priced far beyond their actual value. If there is a factor introduced to destroy the balance of the economy, then the markets start to deteriorate. Consumers are discouraged from purchasing more than they need, and prices start to fall, which further reduces income; ultimately, the economy enters a contraction phase. In fact, it can involve much more complicated reasons, but this scenario is one possibility of how the economy goes from peak to contraction. Now, how can we adjust the economy back to normal? Under the classic economics theory, the economy can recover by itself under its own price adjustment mechanism. However, the economy nowadays is more complicated than before, and there are situations where economy can’t recover without governmental assistance. That’s why there are fiscal and monetary policies to correct the market failure. The most heard policy in recent years would be Quantitative Easing. It’s a set of procedures the Federal Reserve inject liquidity (cash or other liquid assets) into the market by massively purchasing mortgage-backed securities and treasury bond. It can significantly decrease the interest rate and improve consumer’s ability to borrow, thus stimulating spending and driving prices back to the equilibrium level. On the other hand, as price increases, it also means that inflation is expected. This is where the Fed wants to introduce the tapering policy, which means to gradually reduce the purchases of bonds and securities. By tapering the amount of bond purchases, the Fed is trying to start Quantitative Tightening, which means the Fed is selling its bonds and securities and withdrawing the liquidity from the market. It will increase the cost of borrowing and weaken consumers’ ability to spend. Most of the time, the Federal Reserve targets annual inflation at a 2% level to prevent the economy from overheating. This whole set of procedures was meant to keep the price of goods and services at a level that most of the consumers can afford, preventing buying inequality.

On this topic, experts’ idea seems to be unanimous. Instead of focusing on what the Fed’s tapering could do to the domestic economy, more attention was drawn to observing the adverse effect that tapering brought to emerging economies, or developing countries. How did it happen exactly? This whole scenario was initiated by the change in interest rates. As the Fed starts to taper the bond

purchases, it'll induce an increase in the US' interest rate, which means it has become more profitable for investors. Consequently, it will attract more people to invest in United States, causing a capital outflow for other countries and depreciate their currencies. Thus, the goods and services in United States will be more expensive, making it difficult for people to purchase them. In 2013, Fed announced their intention to initiate tapering, which made investors to terrify and starts to sell of bonds, eventually caused a spike in interest rate. This is known as the "tapering tantrum". After this incident, Eichengreen and Poonam [3] worked on an article that investigated how did tapering adversely affected different emerging markets. They utilized the exchange rates and foreign reserves to analyze which country were hit and why. In result, it indicates that the country who allowed unrestricted expansion of their real exchange rate and current account deficit, received the heaviest impact from tapering. The market size is also an important factor; larger markets tend to be more impacted by tapering. They concluded that these large economies (market) are heavily influenced because it provides its investor a liquid market that they can easily change their portfolio. Nechio [4] also focused on the impact of tapering on developing countries. He suggested that as Fed starts to taper, it is important for emerging market countries to improve their economic fundamental to adapt the rapidly changing global monetary conditions. Aizenman, Binici and Hutchison [5] have similar focus as Eichengree and Poonam [3] did, but they got different results. Through evaluating the current account, external debt, and international reserves, they find that countries that have a "robust" economy (current account surpluses, high international reserves, and low external debt) is more adversely affected by the tapering, which does not agree that countries with current account deficit should be more adversely affected by tapering. However, they do agree that larger scale of economy is more negatively affected.

With all these experts' opinions introduced, it is clear that the Fed's tapering decision could have shocked the domestic economy and deteriorated the foreign economy. Therefore, this article is going to focus on how did tapering affected consumers' behavior and global economy. This article is going to use regression analyses to estimate consumers' reaction toward the Federal Reserve's policy and the correlations between the US economy and foreign market. The economic indicators being analyzed in this study include: 10-Year Real Interest Rate, CNY to USD spot exchange rate, Market Yield on US Treasury Securities with a maturity of 1 year, 5 years, 10 years, and 30 years. These data are going to be drawn from FRED's database (Federal Reserve Economic Data). We also went through the FOMC's calendar to record the date that they made announcements. By putting the dates and the treasury rate together in a regression analysis, we'll know how has Fed affected consumers' behavior.

3. Methodology

To investigate how would consumers interact with Federal Reserve's tapering decision, we need to understand the mechanisms of how Fed can manipulate the interest rate. As the basic economic theory defines, the suppliers of a good and services tends to charge an expensive price when demand for is relatively high and lower their prices when the demand is relatively low. This also applies to the bonds market. This supply and demand relationship is the key for Federal Reserve to control interest rate, and here exists another mechanism between bonds' price and interest rate. We can set up an example to further explain it. Suppose now Fed wants to adjust its interest rate to a level that is above the current situation, but Fed can't directly set the interest rate. How should Fed achieve its goal? Federal Reserve has a policy named monetary policy, this is an economic toolkit that Fed uses to adjust economy to its set target, and open market operation is one of the "tools". In this example, Fed is trying to increase the interest rate, and they would need to commit contractionary open market operation, which means that Fed stopped buying more bonds and begin to sell them back into the

market. In result, the prices of bond were decreased as Fed decreased their demand for bonds, and ultimately increase the yield of bonds. A formula can help to illustrate the above explanation:

$$\text{yield of bond} = \frac{\text{payoff} - \text{price}}{\text{price}}$$

Here, the yield of bond is the same as the interest rate for each investment of bond. Now, we have figured out how can Fed manipulate interest rate, how is this affecting the foreign market? It's because that as Fed increase the interest rate, it indicates that the return for each investment is higher. It would be more sensible for consumer to start investing in United States than in anywhere else. It made the assets in United States become more valuable, the value for dollar is also driven up, therefore appreciate against other currencies. This is what happens when Federal Reserve make regular adjustment to the economy, showing the interaction between interest rate and exchange rate. However, we want to investigate the market forces when the economy is recovering from recession, and it would've involve with long term interest rate, which is not likely to happen in open market operation, but rather common in Quantitative easing. Nonetheless, the formula is still applicable regardless of the types of bonds.

Now that we have understood the basic mechanism, we can start analyzing the data. First, we want to prove that interest rate and exchange rate are statistically related, and it could be done through a regression analysis. We have gathered 213 samples from the past 16 years and 9 months. We will be using 0.05 as our significance level to determine whether the explanatory variable (10-Year Real Interest Rate) predict the response variable, the exchange rate of Yuan (Chinese currency) to USD. We used Chinese currency because we think that Chinese export market is large enough to be representative of other countries export business, so studying their statistical indicators would be helpful in envisioning other foreign market. Here are the statistics for our analysis:

Table 1: Regression analysis table of 10-Year Real Interest Rate and Yuan to USD exchange rate

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	6.33	0.03	187.55	1.1E-236
10-Year Real Interest Rate	51.69	3.16	16.36	2.13E-39

According to the table, we can compute that for every one percent increase that happens in the interest rate, it increases exchange rate by $1\% \times 51.69$ (which is 0.5169). Since our p-value is much smaller than 0.05, we can say that interest rate gives a strong prediction toward the Yuan to USD exchange rate. The line of best fit graph also shows how closely are exchange rate and interest rate related:

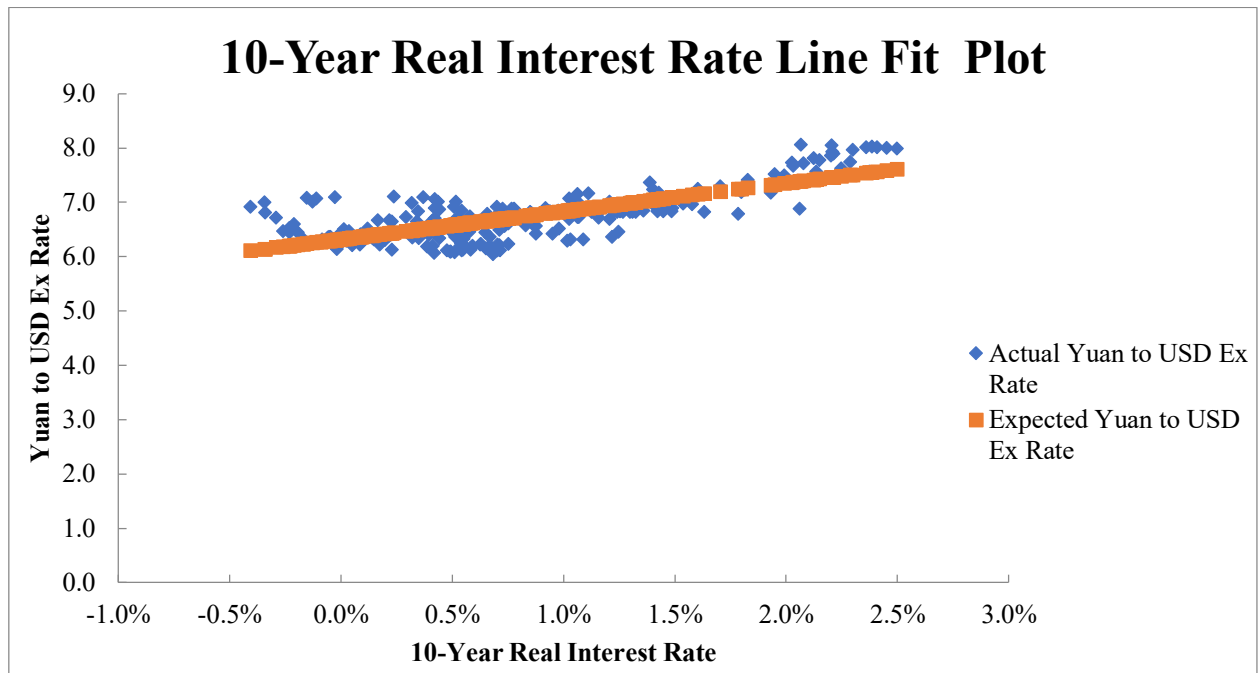


Figure 1: Line fit plot of 10-Year Real Interest rate and Yuan to USD exchange rate

Now that we have proved how foreign market are statistically related, we can begin to analyze how interest rate react to the Fed’s announcement. In 2021, Fed has announced to taper from the fourth round of Quantitative Easing, and therefore we can analyze this period of interest rate to see how consumers are reacting to a contractionary policy. We have gathered 445 observations for each treasury’s daily rates and the dates of Fed’s announcement from January 3rd, 2022 to October 13th, 2023. Since we can’t analyze every types of bond in the market, we’ll only pick the long term treasury bond that has a duration of 1 year, 3 years, 5 years, 10 years, and 30 years. Instead of estimating the interest rate itself, we calculated the daily difference of these interest rates. This way, we can analyze how impactful are Fed’s announcement toward the daily change of interest rates. For the “Fed’s announcement”, we converted them into a set of dummy variables, denoting “1” for the days that Fed made announcements, and “0” for the days that Fed kept silent. Then, using interest rate as response variable and “Fed Announcement” as our explanatory variables, we conducted 5 separate linear regression analysis, and evaluate each of their reaction to the change of Fed’s policy. Here is a table of results from our analyses:

Table 2: Regression analysis of 4 types of long-term treasury bond and date of Fed’s announcement

Type of bond	Coefficients	P-value
1 Year	-0.037	0.065
3 Years	-0.050	0.040
5 Years	-0.054	0.020
10 Years	-0.048	0.021
30 Years	-0.037	0.036

According to the table, we can see that except for 1-year treasury rate, almost all the treasury rate exhibits a p-value under 0.05, which means that Fed’s announcement is statistically significant in predicting most of them. It also reflects that Fed’s tapering decision can impact the consumers’ behavior, and therefore change the domestic bonds market. However, we noticed an intriguing

discovery in this regression analysis, and it's not in accordance with our previous expectation on interest rate. Intuitively, we know that whenever Fed applies tightening policy, the interest rate should be increasing. However, according to the table above, the coefficient for each treasury bill yield exhibits a pattern that, rather than increasing the rate, it's decreasing them as Fed made their announcements. This is completely opposite of what we should be expecting. In an interview with Professor Rogoff [6], he mentions that consumer's psychology also plays an important role in economic. So, we think that this bizarre finding has to do with consumers' expectation and timeliness of Fed's policy. When Fed announces their tightening decision, the policy is not immediately implemented, which means that the interest rate has not been adjusted yet. However, investors have received this information, and they know that the treasury rate is going to increase in the future. Therefore, they react to it by changes their portfolio, demand for treasury investment increases. As the demand for treasury bond increases, the price of treasury bonds increases correspondingly. In response to its increased price, that is why we can observe a decrease in the treasury rate.

4. Conclusion

Now, it has been statistically proven that the Fed's tapering decision decreases interest rates within a certain period. Theoretically, as the interest rate drops, we should expect a depreciation in the dollar; it means that America's goods and services are cheaper for other countries. However, statistical inference only explains a pattern; is it what happens in a real-world economy? According to the previous articles we've adduced, experts unanimously concluded a negative view on how tapering decision affects other emerging markets. Especially in Basu, Eichengreen, and Gupta's work [1], the Fed's tapering decision even triggered an 18% depreciation in the Indian exchange rate. So, why is this happening? As we said before, the changes in the Fed's decision could've affected investors' portfolios. Those who originally invested their money in foreign countries like India started shifting their investments to the United States. Therefore, as more and more investments are leaving these countries, it causes a capital outflow for them and ultimately depreciates their currencies. In this world of open economies, it is unavoidable that adjustments in domestic economic policy can affect other countries.

Although it is unavoidable that tapering worsens other countries' benefits, is there a way to weaken its effect, or prevent the taper tantrum in 2013 from happening again? In March 2021, the Federal Reserve announced the start of another tapering round; many feared another taper tantrum was coming. However, as the time comes to 2023, it seems that consumers are not frightened by this news, and the interest rate did not rapidly increase as it did in 2013. Due to the Fed's clear demonstration of the tapering decision, consumers are well prepared for this incoming impact. Another reason could be attributed to the outbreak of conflict between Russia and Ukraine. Due to massive resources being utilized in war, the decrease in liquidity has induced sky-rocketed inflation in the United States. Therefore, people were hoping that the Fed could do something to fix the economy.

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